Page 20, line 5+:

A9

Since the filter algorithms corresponding to a respective filter IDs are specific to a particular type of data of interest and are fully flexible to express the criteria which reflects the reason for interest (e.g. data having certain common bit values or data containing any change in designated bits) a logic "1" appearing in the final matchword will indicate that the data bit string is, in fact, of interest and the Filter ID can be used to identify the reason for the interest. Therefore, storage in memory can be easily controlled by simply ORing the bits of the final matchword and storing the data bit string and, preferably, the matchword itself, in memory (in a file or at an address indicated by the filter ID, possibly replacing previously stored data) if the result is a logic "1". If the result is a logic "0", the bit sting in the data stream is not of interest and may be safely discarded.

REMARKS

Claims 1 - 14 remain active in this application. The specification has been reviewed and editorial revisions made where seen to be appropriate. No new matter has been introduced into the application.

Claims 1 - 14 have been rejected under 35 U.S.C. §103 as being unpatentable over Zaun et al. in view of Mao et al. This ground of rejection is respectfully traversed.

Initially, it is noted that the Examiner is relying upon the filing date of the provisional application from which the published application of Zaun et al. claims priority and that the filing date of the provisional application is December 14, 1999, while the filing date of the present application is March 23, 2000. Since it is Applicants' position that Zaun et al. is of marginal, if any, relevance to the present

invention and the rejection improper since a *prima facie* demonstration of obviousness has not been made in regard to any claim in the application, the invention will be substantively distinguished from the applied references, below. However, it is to be understood that the following remarks are made without prejudice to later presentation of evidence of prior invention under 37 C.F.R. §1.131.

The present invention is directed to the effective provision of a digital filter having an arbitrary filter function of arbitrary length which can be applied to filter a data stream of the same or different arbitrary length using an amount of hardware which is small enough to be economically acceptable in a set-top box (STB) which must be produced in large quantities at low cost for distribution to subscribers or the like. It appears from the statement of the rejection that there is some confusion between the arbitrary length of the data stream and the arbitrary length of the filter function which can be applied to the data stream in accordance with the invention. It also appears from the statement of the rejection and the portions of the references relied upon by the Examiner that there is substantial confusion between the "not match" bit which specifies whether the filtering will be positive or negative in accordance with the invention as reflected in the recitation of claim 1 of "filtering ... in accordance with a mask ... and a logic state of a not match bit" and a match or not match output reflecting a comparison of a filter data pattern and a mask with a portion of a data stream.

To achieve the meritorious function of being able to filter a data stream against a filter function of arbitrary length, the invention, as claimed, approaches the data stream in blocks corresponding to an arbitrary number of bytes (preferably four) for which a filter

data pattern, mask (specifying which bits are important to the filter function and which are not/don't care) and, importantly in regard to the invention and the flexibility of the filter function which may be applied, a "not match bit" corresponding to a byte or other arbitrary number of bits and controlling whether a positive or negative filtering function is to be applied thereto can be specified and rapidly changed to provide a plurality block-sized filters to be applied to each of a sequence of blocks of the data of the data stream being filtered. Further, the specification of a next mask, as claimed allows specification of the filter function for a following block of a filter function which is effectively of arbitrary length. Most importantly to the invention and as claimed, the invention provides for accumulation or combining of the output matchword or compare result over a plurality of blocks of arbitrary number *and in accordance with a logic state of the not match bit* in order to apply a filter of arbitrary length/number of block-sized filters and arbitrary function to an arbitrary length of the data stream. (See Figure 3 and pages 18 - 20.)

In contrast, Zaun et al. is directed to providing a remultiplexer (which selects packets to be multiplexed by packet ID (PID, which may or may not correspond to *program* ID, sometime also abbreviated PID) in order to discard signals of programs which are not of interest in order to conserve bandwidth) capable of providing two output streams. For this purpose, the table of PIDs which also contains a bit indicating whether a given PID is valid for inclusion, is divided into an active, upper table and a pending, lower table which can be modified while being kept separate from the active table during any modification which can take an extended amount of time (e.g. several minutes (page 1, paragraph 0004). The active and pending PID tables are interchangeable and the pending PID table, once

modification is complete, can be used as the active PID table for filtering. The modified PID table is thus used to determine which packets are accepted/filtered for remultiplexing into one or more output data streams.

While, the filter of Zaun et al. may be applied to a data stream of arbitrary length as must, trivially, be the case where packets having a number of different PIDs, respectively, are accepted or rejected and sorting performed among the accepted packets, the PID filter which the Examiner is evidently applying against the claims is necessarily of specified format and limited length; evidently thirteen bits from the "8192 possible values" thereof (page 3, paragraph 0029). Further, only positive filtering is appropriate where the packet ID must match a desired packet ID. Therefore, as alluded to above, while Zaun et al. must, trivially, have a match/not match comparison result, nothing is seen in Zaun et al. which specifies whether the filtering will be positive or negative (as recited in claims 1 and 8) or (in the terms of claim 1) in correspondence with the mask (which the Examiner admits is not taught of suggested by Zaun et al.) and a logic state of a not match bit, much less a next mask specification or (as recited in both claims 1 and 8) a combining of compare result values to support the function of "whereby an arbitrary length of said transport table sections *are filtered by an arbitrary number of filters having arbitrary filter functions.*" (emphasis added).

The teachings and suggestions of Zaun et al. are not supplemented by the teachings of Mao et al. at any of these points of deficiency to answer the claimed subject matter. Mao et al. is directed to remapping of internet data into MPEG data format for unidirectional broadcast. The examiner's statement of the rejection summarizing the content of Mao et al. is silent as to

the teaching of a use of a mask in the environment of the arrangement of Zaun et al. and thus does not make a *prima facie* demonstration of obviousness even as to the Examiner's admission of the deficiency of Zaun et al. Further, nothing is seen in Mao et al. remotely corresponding to a next mask specification to allow block articulation of a plurality of masks into an effective mask of arbitrary size, the use of a not match bit as an input for controlling the filter function or combining compare results, particularly in accordance with not match bits. It is also respectfully submitted that mao et al. and Zaun et al. whether taken together or separately provide evidence of a level of ordinary skill in the art which would support the conclusion of obviousness asserted by the Examiner since they do not recognize the problem to which the invention is directed or lead to an expectation of success in achieving the meritorious functions of the invention by virtue of the claimed subject matter.

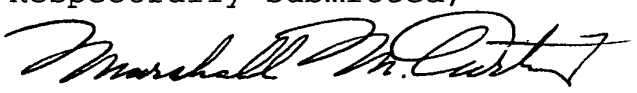
Accordingly, it is respectfully submitted that no *prima facie* demonstration of obviousness can be made based on Zaun et al. and/or Mao et al. and the ground of rejection of claims 1 - 14 asserted by the Examiner is clearly in error. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

Since all rejections, objections and requirements contained in the outstanding official action have been fully answered and shown to be in error and/or inapplicable to the present claims, it is respectfully submitted that reconsideration is now in order under the provisions of 37 C.F.R. §1.111(b) and such reconsideration is respectfully requested. Upon reconsideration, it is also respectfully submitted that this application is in condition for allowance and such action is therefore respectfully requested.

If an extension of time is required for this

response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Deposit Account No. 09-0457 of International Business Machines Corporation (Endicott).

Respectfully submitted,



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APPENDIX

Page 4, line 10+:

More importantly, under the MPEG-2 convention, tables are used for non-audio/video data such as program schedule and navigation data or supplemental data such as sports statistics or subtitle data which may be displayed at the will of the user or even control data to control reception for limited access (e.g. pay-per-view) programming. In general more table data than is necessary is transmitted to be certain it is [avvailable] <u>available</u> when needed by the STB.

Page 5, line 18+:

The most commonly filtered field within the section table layer syntax of MPEG-2 compliant data is the eight bit Table ID field since the [tagle] <u>table</u> ID field is the most basic identifier for table sections and a hardware filter may be configured to send to memory all table sections having a particular PID value that also have a table ID field matching or partially matching a defined value. This is also an example of positive filtering where a match of one or more bits must be found for the data to be passed for storage. Such positive filtering with an effectively variable filter length provided by the above-incorporated application meets not only the applications program interface (API) definition of common middleware (e.g. between a low level operating system and an application program) implementations but extends the API to allow many programmable variations such as variable length filtering which can be critical for future applications such as internet protocol (IP) packet transmissions.

Page 6, line 25+:

Unfortunately, while the filtering arrangement of

the above-incorporated application would accommodate long runs of data, it is directed to only positive filtering. Prior to the present invention, no alternative exists for negative filtering of long runs of data other [that] than registers and gate arrays sufficiently extensive to accommodate the maximum data bit string to be compared. Such an approach would require extensive hardware or present a substantial processing burden if implemented in software; neither of which is economically acceptable in a STB, particularly where a large plurality of filters must be implemented in separate hardware (to reduce overall set-up time) as is generally desirable in STBs. The absence of such filtering action results in the storage of data which must be later processed/parsed and discarded. Since no alternative exists, however, unconditional storage of such data increases required storage capacity in the STB and imposes a processing burden that cannot be avoided.

Page 13, line 22+:

The invention also provides a further not match indicator register 40 in a manner which is linkable to other filters and blocks and which is preferably four bits long to correspond to the four bytes of the mask, filter and data registers. The respective bits of the not match indicator register control whether positive or negative filtering is to be applied to the respective byte of data. Under the MPEG-2 standard, no greater granularity of mixing of positive and negative filtering is anticipated but a bit of the not match indicator could be provided for each bit or arbitrary group of bits of the mask, filter and data registers if desired. Thus, for example, ["] if a not match bit NMn is "0", positive filtering will be applied to the corresponding byte n (or bit or group of bits) and if the not match bit is "1", negative

filtering will be applied.

Page 16, line 18+:

A filter ID is preferably implemented with a section filter ID and a pointer in the form of a "next filter ID" which correlates the section filter ID with the current block of data being filtered to supply appropriate mask and filter register data (e.g. along a row of Figure 4). The section filter ID and next filter ID are preferably specified in a control word along with other data such as a next column flag, a match/not match flag (which cannot be used to express mixed filtering) or be correlated with mixed or negative filtering for another block to control arbitrary filtering over long bit strings.

Page 17, line 19+:

Figure 3 similarly illustrates operation of the filter arrangement of the invention in regard to a next or subsequent block of data. For purposes of this discussion, this next or subsequent data block will be considered to contain byte 6, byte 7 byte 8 and byte 9. Again, the filter blocks are set up into a second column 310 (column 1) [on] of M filter blocks (wherein M can but need not equal N and results in a thirty-two bit matchword MW1 which may immediately be combined with matchword MW0, in a manner depending on whether or not the current filter algorithm includes negative filtering. Specifically, the respective compare result CR bits of each matchword, as developed, is logically combined with the logically combined result of all prior matchwords using AND logic if the current filter block is a positive filter (NM = "0") and using OR logic if the current filter block is a negative filter.

Page 18, line 6+:

Thus a single matchword will be developed at the

end of each column and at the end of each variable length word, when all desired filter functions have [be] been performed on all data blocks by all filter columns, as depicted in Figure 4. Thus each row of Figure 4 will correspond to a filter ID of arbitrary length. The depiction in figure 4 provides three arbitrary filter functions of at least ninety-six bits in length (three columns x data block length). Positive and negative filtering is tracked through the columns (in order to provide positive, negative or mixed filtering on each byte of each data block by the representation of matches under positive filtering and mismatches under negative filtering by the same logic state of the corresponding CR value in the matchword formed over a column and accumulating the final matchword by respectively ANDing or ORing the respective CR values depending on whether the current filter block included positive filtering (e.g. positive or mixed filtering over the data block [cooresponding] corresponding to an AND function but exclusively negative filtering over a block corresponding to an OR function for proper accumulating of the matchword although other matchword accumulation may be useful).

Page 19, line 12+:

It should be recalled that full flexibility of filter function and variability of length of the datastream upon which filtering is performed is a meritorious effect of the invention. It should also be understood that, in practice, filter functions may be provided in memory (e.g. [pead] read only memory) of the STB or through downloading of a filter function from the transmitted data. A modification of a filter function in memory can also be downloaded from transmitted data. For these reasons, in practice, it is desirable to increase flexibility of filter function by providing for [a] an extra SetMW bit 45 in the

filter block 100, preferably in not match indicator register 40, as shown in Figure 1. This bit may be used to directly control use of [and] an AND or OR function as the matchword is accumulated rather than evaluating the contents of the no match indicator register 40 as described above. Therefore, for example, if the length of the filter function were four blocks (sixteen bytes) long and the respective SetMW values for the four words (e.g. A, B, C, D, in the chronology of the filtering process) were "0110" the matchword would be accumulated in accordance with the expression (((A * B) + C) + D).

Page 20, line 5+:

Since the filter algorithms corresponding to a respective filter IDs are specific to a particular type of data of interest and are fully flexible to express the criteria which reflects the reason for interest (e.g. data having certain common bit values or data containing any change in designated bits) a logic "1" appearing in the final matchword will [indicated] indicate that the data bit string is, in fact, of interest and the Filter ID can be used to identify the reason for the interest. Therefore, storage in memory can be easily controlled by simply ORing the bits of the final matchword and storing the data bit string and, preferably, the matchword itself, in memory (in a file or at an address indicated by the filter ID, possibly replacing previously stored data) if the result is a logic "1". If the result is a logic "0", the bit sting in the data stream is not of interest and may be safely discarded.